(emphasis added). Claim 13 sets forth a population-producing method generally similar to claim 9 but with some narrower ranges and limits of elements, including an upper limit of less than 0.010 wt% Cu. Claims 10 and 14 recite methods of making extruded sections respectively including all limitations of the population-producing methods of claims 9 and 13. The remaining claims are all dependent on one or another of these four claims.

Thus, every claim in the application is limited to a method including performing plural casts (of molten metal containing both virgin metal and recycled scrap) each producing a plurality of billets, characterized by such close and consistent control of copper content that every one of the billets in the resultant population of billets contains less than 0.015 wt% Cu.

The issue of patentability is whether or not it would have been obvious, from the references as applied, to provide the defined close and consistent control of copper content in the claimed billet population-producing method.

Insofar as the references indicate the desirability of a low Cu content, they refer to "amounts . . . as small as possible, preferably less than 0.05" wt% Cu (GB '595, p. 4, lines 8-13) or "Preferably . . . below 0.03" wt% Cu (Morris et al., col. 2, lines 59-63). JP '684 does not specifically mention Cu, but refers to Alloy AA 6063, which may contain up to 0.1 wt% Cu (see Morris et al., col. 1, lines 9-16).

The previously submitted first Declaration of Nicholas Charles Parson under 37 C.F.R. §1.132 (executed June 14, 2000), includes, as Fig. 1, a histogram of copper content in billets produced in 116 casts of an alloy (internally designated Alloy 65054) having a composition within the ranges and limits of present claim 9 except that the feature of close and consistent control of Cu content defined in claim 9 was not employed. The Fig. 1 histogram shows that while many individual billets had Cu levels below 0.015 wt%, many others had Cu levels between 0.0150 and 0.0300 wt%, and a very small proportion had Cu levels of 0.0300, 0.0310 and 0.0320 wt%, though none above the latter value.

This, as the first Parson Declaration explains, "was the normal situation before the present invention." It will be noted that all the billets represented in the Fig. 1 histogram fully satisfied the requirements of GB '595 and JP '684 with respect to limitations on copper content, and almost all satisfied the more rigorous "preferably less than 0.03" wt% Cu limit of Morris et al.

The first Parson Declaration also includes, as Fig. 2, a histogram of copper content in a population of billets produced according to the method of claim 9 including the close and consistent control of Cu content recited in the claim, in plural casts of an alloy (internally designated 64059). Every single billet of the population had a content of less than 0.015 wt%, i.e., less than one-third of the Cu limit of GB '595, less than one-half of the Cu limit of Morris et al., and less than one-sixth of the Cu limit of JP '684.

As the first Parson Declaration further explains, the use of recycled scrap with virgin metal is economically desirable, but

> "Unless steps are taken to control the composition of the metal produced, it is inevitable that Cu content of some members of a series of casts produced in the casting centre will contain more Cu than is acceptable in improved billets of the present invention,"

i.e., Cu above the claimed limit of <0.015 wt %(first Parson Declaration, p. 5). The steps to be taken include "adequate control of the scrap addition[,] . . . attention to the Cu content of the virgin metal and planning of alloy changes and furnace flushing" (*Ibid.*). To control the Cu level below 0.015%, preferably below 0.010%, in all of the metal from cast to cast, as the present claims recite,

> "requires a previously unrecognised level of control over the use of recycled scrap, furnace flushing and planning of alloy changes. It also imposes extra restrictions on the production process which had not previously been considered due to increased production costs and the difficulties of running the casting centre

which results in a higher rejection rate from billets not meeting the tight composition limits." (*Id.*, p. 4).

Thus, "producing a population of aluminum alloy billets . . . such that every billet in the population has" <0.015 wt% (or <0.010 wt%) Cu as the claims recite requires use of positive process steps and/or conditions to control the Cu content, involving increased production costs and difficulties of running the casting center, without which at least some members of the population would have Cu in excess of the claimed upper limit.

Applicants submit that there is no teaching or suggestion in any of the three applied references that would have motivated a person of ordinary skill in the art to undertake the costly and inconvenient modifications of pre-existing procedure necessary to achieve the extremely stringent and consistent control of Cu content defined by the recitals that every billet of the produced population contains less than 0.015 (or less than 0.010) wt% Cu. In this regard, applicants note again that omissions of express mention of Cu in the references (as in JP '684 and in EXAMPLE 1 of GB '595) do not imply a total absence of Cu, because the Cu with which the present invention is concerned is not a deliberate addition but an amount inevitably present (first Parson Declaration, p. 5) in billets cast from a molten body of virgin metal and recycled scrap.

The Office Action asserts that "It is known in the art of cited references that less impurities would produce better properties." None of the references, however, intimates that Cu content below the "preferably less than 0.03" wt% of Morris et al. is a result-effective variable for any purpose, or that uniformly decreasing the Cu content to one-half (or less than one-half) of the Morris et al. upper limit would produce better properties at all. What GB '595 means by "as small as possible" is simply "preferably less than 0.05% by weight."

Further, the Office Action asserts that "Difference in degree of purity itself does not predicate patentability," but the authorities cited for this proposition do not support its

application to the present circumstances. *In re King*, 43 U.S.P.Q. 400 (C.C.P.A. 1939), involved claims to "hexuronic acid C" (vitamin C) which the applicants had isolated from lemon juice. The court held the claims properly rejected "on the ground that they merely define the product in a purified form" and observed that "Difference in degree of purity itself does not predicate invention," citing *In re Merz*, 38 U.S.P.Q. 143 (C.C.P.A. 1938), which upheld a rejection of claims to artificial ultramarine free of floatable impurities. The *Merz* court said,

> "We are in agreement with the tribunals below in their holdings that while appellant may be entitled to a patent on a method for purifying an ultramarine either artificial or natural, he is not entitled to a patent on the article which after being produced has a greater degree of purity than the product produced by former methods." 38 U.S.P.Q. at 145.

Thus, both *Merz* and *King* (relying on *Merz*) involved claims to purified products. All the claims in the present application are directed to methods, to which, as the *Merz* court made clear, its decision is inapposite.

In re Cofer, 148 U.S.P.Q. 268 (C.C.P.A. 1966), is cited in the Office Action for the proposition that "Changing form, purity or other characteristic of an old product does not render the novel form patentable where the difference in form, purity or characteristic was inherent in or rendered obvious by the prior art." What *Cofer* actually states, however, is that

> "each case must stand on its own facts. The cited cases fail to support the broad proposition that
>
> > * * * merely changing the form, purity or another characteristic of an old product, the utility remaining the same as that for the old product, does not render the claimed product patentable. * * *
>
> "We think examination of the decisions . . . will demonstrate that the materials involved therein were